

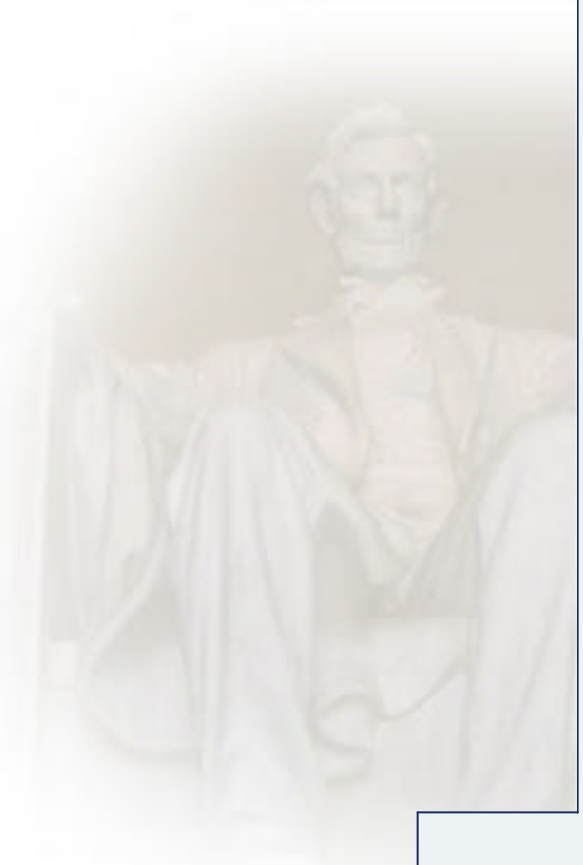
Wireless Security 101





Agenda

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- Agenda
- Goals
- Quiz
- Quiz Answers
- WLAN Productivity Case Study
- Overall Recommendations
- Goal Review
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Goals

- Become acquainted with basic wireless terminology
- Introduce basic wireless LAN equipment
- Address basic wireless LAN threats & vulnerabilities
- Discuss basic wireless LAN risk mitigation techniques
- Discuss wireless technology developments
- Discuss the future of wireless technology



Wireless 101

QUIZ

Why is it that the
only location where
employees have access
to all their productivity tools...is the one location
where they spend the
least amount of time—
their desks?



Question 1

What kinds of wireless communication devices do you use at work and/or at home?

- a) Laptops, PDAs
- b) Ham radios, CBs, Walkie Talkies
- c) WLANs

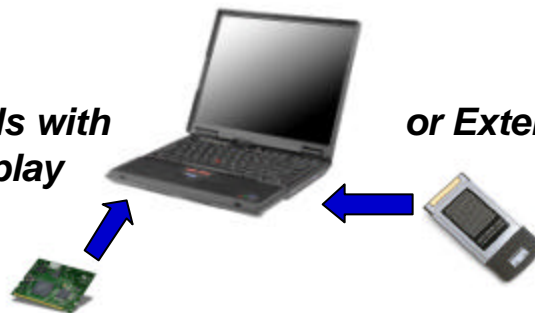


**By the end of 2003, 50% of
All Corporate Laptops Will
Have a WLAN Connection!**

Gartner/Dataquest, 9/02

*Embedded Mini-PCI Cards with
Antenna Built Into Display*

or External PC Cards





Question 2

When did the first wireless message get sent?

- a) When Marconi invented radio
- b) When Cain hit Able with a piece of fruit
- c) When smoke signals were seen off in the distance on the TV show Bonanza



Question 3

What does “wireless” communication mean?

- a) Mobile access to information
- b) Communication without wires
- c) The transference of information without a physical transport medium



Question 4

What equipment comprises a basic wireless LAN?

- a) Gateway, Server, Receiver, Laptop
- b) Access Point, Client Network Interface Card, Laptop
- c) Mobility Module, Firewall, Access Derivative, Laptop



Question 5

Which of the following most looks like a wireless Access Point?

a)



b)



c)





Question 6

Which of the following most looks like a wireless client Network Interface Card (NIC)?

a)



b)



c)





Question 7

How does a basic wireless LAN work?

- a) Access Points connected to the wired infrastructure broadcast radio waves that are picked up and connected to by client NICs
- b) NICs receive signals from Access Points controlled by satellites
- c) Access Points magically transmit stuff that laptops understand



Question 8

A wireless network's Service Set ID (SSID) is an identity-based verification mechanism that can be accessed by users who provide it with:

- a) The proper shared cryptographic key
- b) The proper network SSID
- c) An empty string in place of the SSID



Question 9

Which of the following wireless standards are the most highly adopted and why?

- a) 802.11a-5GHz, physical throughput of 54(30)Mbps, 8 Channels
- b) 802.11b-Wireless Fidelity (Wi-Fi) 2.4GHz, 11(6)Mbps, 3 Channels, Lower Cost, Lower Power (important for handhelds)
- c) 802.11c-Bridging
- d) 802.11d-Multiple Regulatory Domains (International Regions)
- e) 802.11e-Quality of Service
- f) 802.11f-Inter-Access Point Protocol (Roaming)
- g) 802.11g-2.4GHz, 54Mbps (High throughput upgrade from 802.11b that is fully forward/backward compatible with 802.11b)
- h) 802.11h-Dynamic Frequency Selection & Transmit Power Control
- i) 802.11i-Security
- j) 802.1x-Security: Extensible Authentication Protocol (EAP)



Question 10

What are the main differences between 802.11a, 802.11b, and 802.11g?

- a) 802.11a is faster than 802.11b
- b) 802.11b is cheaper, has a wider broadcast range, and is more widely adopted than 802.11a
- c) 802.11g is a high throughput version of 802.11b that is fully forward/backward compatible with existing 802.11b implementations



Question 11

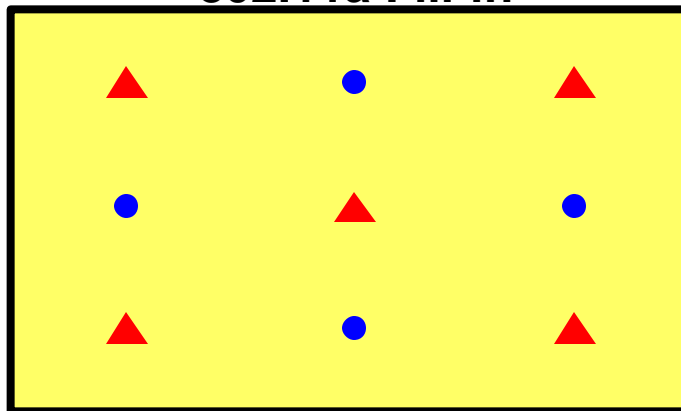
It can be a good idea to deploy both 802.11b & 802.11a Access Points (APs) together.

- a) True
- b) False

▲ = Dual-band coverage

● = 802.11a coverage

“802.11a Fill-in”



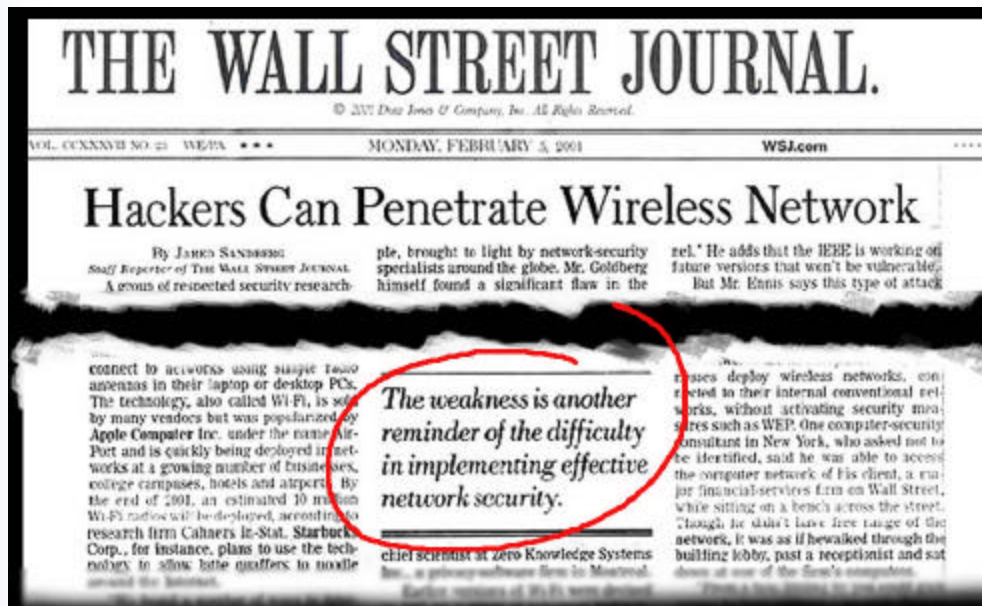
Deploy dual-band APs based on 802.11b coverage,
then install 802.11a-only APs in between



Question 12

What are the biggest threats to a wireless LAN (WLAN)?

- a) Theft of equipment
- b) Unauthorized access
- c) Acts by malicious users to include: Identity theft, loss of sensitive information, and connectivity to network management controls





Question 13

What are the biggest vulnerabilities of a WLAN?

- a) Lack of physical security and standard default settings
- b) All the vulnerabilities that exist in a conventional wired network
- c) The inability to authenticate Access Points
- d) Weak native encryption



Question 14

Which of the following provide wireless **authentication**?

- a) 802.1x-based LEAP
- b) 802.1x-based EAP-TLS
- c) 802.1x-based PEAP with one-time passwords (OTP)



Question 15

The proper order of evolution in wireless **encryption** is:

- a) WEP, TKIP, WPA, AES
- b) AES, WPA, TKIP, WEP
- c) LEAP, EAP-TLS, PEAP, AES

Level of Security	Encryption	Authentication
Bronze	WEP	MAC
Silver	TKIP	LEAP
Gold	WPA	PEAP
Platinum	AES	PEAP + OTP



Question 16

Which of the following are wireless intrusion detection tools?

- a) NetStumbler Spyglass (NSS)
- b) AirSnort
- c) Internet Security Systems Wireless Scanner



Question 17

To mitigate WLAN risks one should:

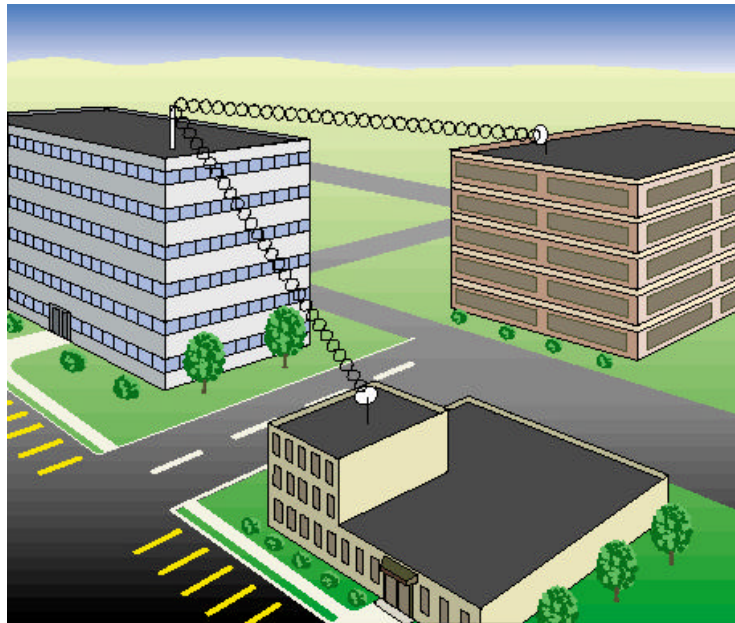
- a) Strategically place and tune Access Points (APs) so that wireless coverage is only available where needed
- b) Have firewalling and router ACLs between the APs and the internal wired network
- c) Use encryption between wireless nodes and wired nodes
- d) Install Intrusion Detection tools on the wired side of the APs



Question 18

Wireless systems can provide inexpensive network redundancy.

- a) True
- b) False



“Properly designed, a wireless broadband network can be flexible, scalable, and customized enough to offer...solutions from a ‘mirror image’ voice/data ‘hot standby’ network to a single diverse private line connecting to a primary carrier.”

***Disaster Recovery Journal
– Winter 2003***



Question 19

Which of the following will help harden a wireless environment?

- a) Aware Systems administrators, Managers, and End users
- b) Changing the default SSID settings
- c) Utilizing encryption methods



Question 20

The future of wireless is:

- a) Imminent, since 802.11 technology has gone mainstream
- b) Inexpensively increasing employee productivity
- c) Likely to increase as Access Points extend wired networks
- d) Important to understand in order to maintain availability, integrity, and confidentiality of information systems and their data



Quiz Answers

- | | |
|------------------------|-----------------|
| 1. Group Participation | 11. It depends. |
| 2. Group Participation | 12. All |
| 3. All | 13. All |
| 4. B | 14. All |
| 5. A, B | 15. A |
| 6. A, C | 16. A, C |
| 7. A | 17. All |
| 8. All | 18. True |
| 9. A, B, G, | 19. All |
| 10. All | 20. All |



WLAN Case Study: Increased Productivity at Microsoft

Campus-wide Cisco Aironet installation
+ Actively used by 40,000 employees
= 30 minute productivity gain per employee per day



Microsoft®

- Minutes gained working at the beginning of slow starting meetings
- Eliminates “I’ll do it when I get back to my desk” syndrome
- Instant Messaging allows for getting answers without disturbing meetings
- Can send all participants (conf. call too) presentation so they can view it simultaneously without a projector



Overall Recommendations

- Allow “business needs” to determine implementations
- Ensure policies are established
- Ensure procedures are enforced
- Eliminate default passwords
- Despite their limited value, use the technical controls available (e.g. WEP)
- Identify devices with wireless functionality
- Utilize network discovery tools for Configuration Management (including discovery of rogue devices)
- Due to the frequency and complexity of changes in the wireless arena, ongoing education is vital



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References

- NIST Special Publication 800-46, Wireless Network Security
- <http://www.cisco.com/en/US/products/hw/wireless/index.html>
- http://www.3com.com/products/en_US/prodlist.jsp?tab=cat&pathtype=purchase&cat=13&selcat=Wireless+Products
- <http://www.netstumbler.com/>
- <http://airsnort.shmoo.com/>
- <http://home.attbi.com/~digitalmatrix/nsspyglass/>

Wireless Security Primer

Thank you.

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